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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/610,498	06/30/2003	Francis G. Celii	TI-34580	5368
23494	7590	03/14/2006	EXAMINER	
TEXAS INSTRUMENTS INCORPORATED P O BOX 655474, M/S 3999 DALLAS, TX 75265			DEO, DUY VU NGUYEN	
			ART UNIT	PAPER NUMBER
			1765	

DATE MAILED: 03/14/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 10/610,498	<b>Applicant(s)</b> CELII ET AL.	
	<b>Examiner</b> DuyVu n. Deo	<b>Art Unit</b> 1765	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 10 January 2006.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 3-7 and 9-13 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 3-7, 9-13 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some    \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Claim Rejections - 35 USC § 102*

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claim 10 is rejected under 35 U.S.C. 102(e) as being anticipated by Ying et al. (US 2003/0176073).

Ying describes a method for forming a ferroelectric capacitor comprising: providing a dielectric oxide layer on the substrate 210 (paragraph [0016]); forming a barrier 220 over the dielectric layer (paragraph [0017]); providing a first metal Ir layer 230, a ferroelectric PZT layer 240 and a second Ir metal layer 250 in the order respectively (paragraphs [0018,0019]); forming a TiAlN hardmask over the Ir layer 250 (paragraph [0020]), etching the second Ir layer, the ferroelectric layer, and the first Ir layer using a plasma process at a T about 250-450 degrees C (paragraph [0028]). Wherein the sidewalls of the capacitor have an angle of greater than about 80 degrees (paragraph [0015]).

### *Claim Rejections - 35 USC § 103*

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person

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having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 3-7, 9, 11-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ying as applied to claim 10 above, and further in view of Moise et al. (US 6,211,035).

Ying describes etching the Ir layers using Cl<sub>2</sub>/O<sub>2</sub>/N<sub>2</sub> and the PZT using Cl<sub>2</sub>/O<sub>2</sub> (table 1). Unlike claimed invention, he doesn't describe the Ir etchant includes CO and the PZT etchant includes BCl<sub>3</sub>. Moise describes an etching method of Ir and PZT layers wherein he teaches the Cl<sub>2</sub> and O<sub>2</sub> sources can have BCl<sub>3</sub> in addition to the Cl<sub>2</sub> and CO in addition to O<sub>2</sub> (col. 18, line 65-col. 19, line 13). It would have been obvious for one skilled in the art, in light of Moise, that BCl<sub>3</sub> and CO can be added to the etchant of the Ir and PZT layers as a source of Cl<sub>2</sub> and O<sub>2</sub> to etch the Ir and the PZT layers with a reasonable expectation of success.

Referring to claims 3, 6, and 12, applied prior art of Moise doesn't describe the gases ratios of BCl<sub>3</sub> and Cl<sub>2</sub> are from 1:4-10:1. However, one skilled in the art would find it obvious to determine the gases ratios from the routine experimentation in order to provide optimum ratios of etching gases including BCl<sub>3</sub> and Cl<sub>2</sub> to etch the PZT layer with a reasonable expectation of success.

#### ***Response to Arguments***

5. Applicant's arguments filed 1/10/06 have been fully considered but they are not persuasive.

Applicant's argument that the cited ratio range of the present is not recognized by the cited art as a result-effective variable because they don't indicate that a ratio range may impact the sidewall profile of the capacitor stack is found unpersuasive because it is not necessary to show that a ratio range may impact the sidewall profile of the capacitor stack in order to

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recognize that the ratio range is a result-effective variable. It would be within one skilled in the art to recognize that any processing parameter is a result-effective variable, especially the concentration of an etchant. It would be obvious to one skilled in the art that changing the concentration of the etchant would certainly change the etch rate. Therefore, one skilled in the art at the time of the invention would find it obvious to determine the ratio or concentration of the etchant through test runs in order to provide an optimum range to etch the PZT.

Referring to applicant's argument that Ying does not teach forming sidewalls having angle between 78 and 88 degree. Please see paragraph [0015] where he teaches the sidewalls angle is about 80 degree, which would certain an angle between 78 and 88 degree.

### ***Conclusion***

6. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to DuyVu n. Deo whose telephone number is 571-272-1462.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on 571-272-1465. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Primary Examiner

Duy-Vu N. Deo

3/9/06

